

# **Performance Appraisal**

**Fermi National Accelerator Laboratory**

**October 1, 2000 through December 31, 2001**

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## ***Introduction***

On December 18, 1996, the Universities Research Association (URA) and the U.S. Department of Energy (DOE) executed a performance-based contract for the management and operation of Fermi National Accelerator Laboratory (Fermilab). This contract includes the use of performance measures that are established at the beginning of each performance period as standards to be used in evaluating URA's performance. The DOE Chicago Operations Office (CH) uses the URA Self-Assessment, the DOE Headquarters (HQ) performance evaluation, input from the CH staff that directly supports the Fermi Area Office (FAO), and the FAO Operational Awareness Program to determine a final DOE rating for Science Programs and Operations Management.

The performance period for this evaluation extends from October 1, 2000, through December 31, 2001. This 15-month performance period was due to the conversion of the contract from a fixed-fee basis to a performance-fee basis. A new 5-year contract began January 1, 2002.

Evaluating the URA Self-Assessment, DOE considered the following elements:

- Assessment of specific performance against the contract performance measures;
- Assessment of general performance in the area of the performance measures;
- Description of the status of the program/project/activity;
- Identification of successes;
- Identification of weaknesses and need for improvements; and
- Identification of the path forward to address needs.

Future Self-Assessments should address these elements. Where appropriate, DOE has noted specific comments on the quality of the Self-Assessment for certain performance measures.

The following section summarizes overall performance ratings for the contract performance measures.

## Overall Performance

URA overall performance is rated **Excellent** for Science Programs and **Excellent** for Operations Management. The following ratings reflect DOE's overall assessment of URA's performance, including all sources of input and information such as the FAO operational awareness program, performance measures, and the Self-Assessment.

Functional Area	DOE Rating
<b>Science Programs</b>	<b>Excellent</b>
A. Science Review (overall) (70%)	Excellent
1.1 Quality of Research	Outstanding
1.2 Relevance to DOE Missions and National Needs	Outstanding
1.3 Success in Constructing and Operating Research Facilities	Good
1.4 Effectiveness and Efficiency of Research Program Management	Excellent
B. Tevatron and Experimental Facilities Utilization (30%)	Excellent
<b>Operations Management</b>	<b>Excellent</b>
C. Leadership (10%)	Excellent/Good
D. Environment, Safety and Health, overall (40%)	Excellent
1.1a Integrated Safety Management	Good
1.1b Corrective Action Plan	Outstanding
1.2 Injury Cost Index	Good
1.3 Lost Workday Case Rate	Excellent
1.4 Total Effective Dose Equivalent	Outstanding
E. Infrastructure, overall (50%)	Excellent
1.1 Project Completion Milestones	
1.1a Small Projects	Excellent
1.1b CDF Upgrade	Outstanding
1.1c DZero Upgrade	Outstanding/Excellent
1.1d NuMI	Good
1.1e Wilson Hall	Outstanding
1.1f US LHC Accelerator	Outstanding
1.1g US CMS	Outstanding
2.1 Scheduled Maintenance	Outstanding
3.1 Cyber Security	Pass
<b>System Assessment</b>	
F. Environment, Safety and Health	
1.1 Environmental Releases	Pass
2.1 Minimize Waste and Promote Recycling	Outstanding/Excellent
G. Infrastructure	
1.1 Accuracy of Energy Management System	Outstanding

1.2	Reduction in Substandard Square Footage	Good
2.1	Continuous Improvement	Outstanding
3.1	Energy Requirements Accomplished	Outstanding
4.1	Alternative Financed Projects	Outstanding
5.1	Increase in Efficiency of Federal Buildings	Not rated
6.1	Fermilab Energy Use Reductions	Outstanding
H.	Business	
1.1	Human Resources – Balanced Score Card	Outstanding
2.1	Human Resources – Job Evaluation System	Outstanding
3.1	Training	Outstanding
4.1	Diversity	Good
4.2	Minority Representation	Excellent
5.1	Property – Balanced Scorecard	Good
6.1	Procurement – Balanced Scorecard	Good
7.1	Intellectual Property – Timeliness of Invention Administration	Excellent
7.2	Intellectual Property – Government Rights	Excellent
7.3	Intellectual Property – Procurement and Technology Transfer Instruments	Excellent
8.1	Science and Technology Information – Deliverables	Outstanding
9.1	Technology Transfer and Work for Others	Pass
10.1	Financial Management System- Uncosted Balances	Excellent
10.2	Financial Management System – Delinquent Receivables over 90 and 180 Days	Excellent
11.1	Safeguards and Security – Self-Assessment Program	Pass
11.2	Counterintelligence – Foreign Travel Notification	Pass
12.1	Number of Legal Non-Compliances	Outstanding
12.2	ADR Consideration	N/A
12.3	Mediation Cost Avoidances	N/A
12.4	Number of Improvements – Legal	Outstanding
13.1	Sound Analysis – Legal	Outstanding
13.2	On-time Responses – Legal	Outstanding
I.	Stakeholder Relations	
1.1	Community Involvement	Outstanding
2.1	Annual Peer Review	Unsatisfactory

## ***Status of Previous Recommendations***

This Section addresses the status of DOE recommendations made in the FY2000 Summary Appraisal Report, including those in Attachment 1 of that report that still merit attention.

DOE's FY 2000 Summary Appraisal Report noted URA's uneven performance of its Self-Assessment, which demanded an improved process and consistent approach for assembling and providing information that is constructive and useful. DOE stated in the Summary Appraisal that the Self-Assessment requires commitment by top management, and that its preparation should reflect guidance and methods available in DOE Order 413.1A, so that assessments are supported by real data in Fermilab management systems.

DOE believes that URA top management has made the commitment to a rigorous self assessment process. However, while there have been improvements in some areas, the FY 2001 Self-Assessment did not address this recommendation adequately and did not provide a comprehensive evaluation of the Laboratory's performance. Major areas of the Laboratory were not assessed at all or, at best, superficially, e.g., Science, Leadership, Project Management. Many functional areas provided only a general description of activities rather than an assessment of performance. DOE notes that in some areas, such as Human Resources, maintenance, portions of ES&H, general law and legal support, and intellectual property, URA did make a good effort towards the type of self-assessment required. An overall deficiency in the Self-Assessment is the lack of discussion and evaluation of some of the major issues that the Laboratory encountered during this performance period, e.g. the Type A accident, project management issues, subcontract administration, ES&H concerns, and Tevatron performance. It is recognized that changes to the self assessment process were initiated later in 2001 and may not be fully realized until 2002.

## ***New Recommendations***

1. A concerted effort is needed to address Science Program concerns as outlined in Attachment 1.
2. Efforts must be made to continue to improve the overall quality and comprehensiveness of the Self-Assessment process. As noted above, some improvements have been made, but significant additional effort is necessary to attain the quality of self-assessment envisioned under performance-based contracting.
3. Continued efforts are needed to improve subcontract management. New criteria for evaluating subcontractor performance have been developed for FY 2002 that should be useful in driving improved subcontractor management and performance. Also, the appropriate flow-down of integrated safety management (ISM) to subcontracts should continue with a high level of monitoring to assure that ISM is implemented at all levels of subcontracts.

## Science Programs

### A. SCIENCE REVIEW

Measure 1.1	Quality of Research
Measure 1.2	Relevance to DOE Missions and National Needs
Measure 1.3	Success in Constructing and Operating Research Facilities
Measure 1.4	Effectiveness and Efficiency of Research Program Management

**Objective:** Advancement in the understanding of the fundamental nature of matter and energy.

**DOE Rating:** DOE rated overall performance in the Science Review measures as **Excellent**. Attachment 1 contains the DOE Assessment.

### B. TEVATRON AND EXPERIMENTAL FACILITIES UTILIZATION

Measure 1.1	Tevatron Operations
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**Objective:** Obtain optimal utilization of the Tevatron and experimental facilities.

**DOE Rating:** DOE rates performance as **Excellent**, Actual Tevatron uptime performance was Outstanding (3814 hours, translating to 92% of the expected uptime of 4136 hours); luminosity performance was less than expected, resulting in an overall rating of Excellent for this measure.

## Operations Management

### C. LEADERSHIP

Measure 1.1	Overall Management
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**Overall Objective:** Conduct all work and manage all laboratory facilities with distinction, fully integrated with the scientific and technology mission and the protection of workers, the public, and the environment.

**DOE Rating:** DOE rates performance as **Excellent/Good**, based upon the following discussion.

In determining the rating for Leadership, DOE considered the URA Self-Assessment, the requirements set forth in Section C of Appendix B to the contract, and other relevant information.



The URA Self-Assessment Report assigned a rating of "outstanding" for Leadership, but no rationale or discussion was provided to support this rating. Therefore, the Self-Assessment Report could not be used to support a rating, and DOE's "excellent/good" rating is based on its evaluation against Appendix B requirements and other relevant information.

The following leadership requirements were identified in Appendix B for 2001:

- Provide, as required, highly skilled senior management at the laboratory;
- Implement and maintain proven management systems and processes for enhancing laboratory operations;
- Facilitate the implementation of these with long-term assignments of key leaders and short-term assignments of subject matter experts, as appropriate;
- Conduct, as appropriate, periodic and timely management assessments in various areas of laboratory operations.

The URA management team met each of these requirements at some level during the rating period. However, they were not consistently met in a manner that enabled the laboratory to effectively address in a timely way the serious safety, project management, and subcontract management issues that surfaced in late 2000 and early 2001, particularly with respect to the NuMI Project. Nor did URA management demonstrate that it is providing the necessary leadership for a successful Run II – the highest priority for the U. S. high energy physics program. In the evaluation of the Science program in Attachment 1, it is noted that while the initiation of Run II in March 2001 was a "significant achievement given the long and complicated upgrades involving both detectors and the new main injector", the "Tevatron luminosity reached a plateau and resulted in disappointing performance for overall delivery of data to the experiments in the first year". Run II efforts need continuous management vigilance for success.

The Laboratory found itself in a position where it was not meeting DOE programmatic and operational expectations. However, URA management has visibly responded to the situation. An important aspect of the response was to establish formal internal Director's reviews that are structured to proactively identify and correct program and project problems at an early stage. Additional efforts also have been made to thoroughly brief DOE program personnel on a regular basis. With respect to Run II, the technical and managerial issues are difficult and will not be solved quickly. The effectiveness of the URA management response with respect to Run II can be better evaluated at the end of FY 2002.

With respect to the NuMI project, immediate and appropriate action was taken after the May 2001 DOE review, and the issues were managed aggressively throughout the remainder of the calendar year. The actions that were taken enabled the NuMI project to be successfully rebaselined by the end of the year.



The URA management team worked closely with DOE during the entire effort. Also, as noted above, the URA management team enhanced its management systems and processes to provide greater discipline in managing programs and projects across the laboratory. In addition to the formal internal Director's reviews, URA instituted a peer review process for administrative and operations support functions. Further, it should be noted that with respect to the broader safety system and subcontract management system issues that extended beyond the NuMI project, the laboratory initiated corrective actions in 2001 that should result in improved safety and subcontract management for the future.

Leadership was demonstrated in meeting other challenges during the past year including:

- Ability to strike an effective balance between budget constraints and the demands of a highly ambitious research program;
- Completion of the CDF and D-Zero detector upgrades and the initiation of Run II;
- Management of LHC project responsibilities. URA's management of its LHC responsibilities can be considered a model for others to follow;
- Continued implementation of creative partnerships with private sector utilities to address the serious problems of deferred infrastructure maintenance;
- Effective initial response to a Type A Accident Investigation Board report. A team of highly qualified and committed individuals was assigned to work with DOE to put a Corrective Action Plan into place.

Finally, DOE notes other positive actions. A very highly qualified individual was selected for the position of Associate Director for Operations when it became known that the previous Associate Director intended to retire. URA management also committed to performance-based management and to putting into place a credible self-assessment process. This commitment is reflected in the new five-year performance-based contract and in the critical outcomes, performance objectives, and performance measures negotiated for 2002. Initial steps were taken to strengthen the self-assessment process in 2001, and it is expected that the URA 2002 Self-Assessment Report will be an improved product upon which DOE can place more reliance.

In summary, URA management has performed well. However, the management team was not initially proactive enough in addressing the serious issues that surfaced. The consequence was that these issues became more serious before effective action was taken.

#### **D. ENVIRONMENT, SAFETY AND HEALTH**

**Overall DOE Expectation:** Ensure the safety and health of the workforce and members of the public, and the protection of the environment in all program activities.

## Measure 1.1 Integrated Safety Management

### *Objectives:*

**1.1a. (October 1, 2000 through September 30, 2001):** Conduct all work and manage all Laboratory facilities with distinction, fully integrated with the scientific and technology mission, while being protective of our workers, the public, and the environment.

**1.1b. (October 1, 2001 through December 31, 2001):** Demonstrate timeliness in completing corrective actions for improving the safety of workers and effectiveness of oversight of construction work activities at Fermilab in response to conclusions contained in the Type A Accident Investigation Report, dated August 14, 2001.

**DOE Rating:** DOE rates URA's performance in regard to Integrated Safety Management (ISM) implementation as **Good**. DOE rates performance on the Corrective Action Plan as **Outstanding**.

### **1.1a Integrated Safety Management**

During CY 2001, a number of internal (URA) and external (DOE) focused reviews, project management reviews, accident investigations and self assessment activities identified and documented weaknesses in URA implementation of ISM core functions and principles. These weaknesses were primarily in the area of subcontract management and concluded that URA had not effectively ensured integration of safety into all work planning and performance. In particular ISM implementation has been uneven with regard to subcontractors and sub-tier subcontractors. It is noted that some large projects were managed well and had impressive safety records (e.g., the MiniBooNE and the Wilson Hall Improvements projects). In other projects URA assumed more of a reactive role rather than identifying and actively and effectively addressing causes behind incidents. Conclusions reached in these reviews and investigations indicated the need for significant improvements in:

- Definition of work and work planning;
- Hazard analysis processes that ensure that all task-specific work hazards are identified, documented, and communicated to subcontractors and sub-tier contractors prior to start of work;
- Communication of roles, responsibilities and lines of authorities to ensure adequate protection of workers, including subcontractors and sub-tier contractors;
- Hazard controls to ensure safety of all workers (e.g., PPE and other physical controls or procedures such as scaling);
- Contracting and project management mechanisms to consistently convey, oversee, and enforce ES&H expectations to the subcontractors and sub tiers;

- Flowdown of ES&H requirements into all contracts and adequate oversight of construction projects to ensure full implementation and compliance with contract clause requirements;
- Follow through on construction-related deficiencies to assure items are tracked, closed out and trended to improve safety and add insight into subcontractor program effectiveness;
- Training of Construction Coordinators to enable them to do their jobs effectively;
- Analysis of incident root causes as a mechanism to address identified weaknesses effectively;
- Dissemination of lessons learned from construction activities to construction subcontractors and sub-tier contractors.

Although URA ISM performance was below DOE expectations, the Contractor did successfully achieve timely completion of two actions which addressed remaining opportunities for improvement from the Integrated Safety Management Verification report.

#### **1.1b Corrective Action Plan**

DOE rates performance as Outstanding for the effective response to developing and implementing a corrective action plan to address issues raised in the 2001 Type A Accident Investigation Report of the Drilling Rig Accident.

- Following the June 2001 drill rig accident, which resulted in a Type A Accident Investigation, URA assessed its hazard analysis process and developed a corrective action plan. URA shared the improved process with all construction coordinators and task managers to help achieve site-wide implementation of an improved hazard analysis process.
- URA completed four action items addressing weaknesses identified in the Type A Accident Investigation Report during the performance period. In assigning a performance rating, DOE considered the following three things: 1) the URA response to selected action items; 2) the completion of the four action items within the context of the overall corrective action plan schedule; and 3) the follow-up on the action items once completed.
- URA met the schedule and the expectations for successful completion of the individual action items and used each to reinforce successful implementation of the others. This approach to implementing the corrective action plan brought about significant improvement to the Fermilab Construction Safety Program over a relatively short timeframe.

The URA response to the four corrective action plan action items met expectations for the Type A corrective action plan requirements for the last quarter of CY 2001 (i.e., Measure 1.1b).

URA expeditiously developed a corrective action plan and acted aggressively to complete identified actions, address specific judgments of need, and use every opportunity to improve the construction safety program. These efforts merit an Outstanding performance rating for this measure.

<b>Measure 1.2</b>	<b>Injury Cost Index (CI)</b>
<b>Measure 1.3</b>	<b>Lost Workday Case Rate (LWCR)</b>

**Objective:** See the Overall Objective for Section D, Environment, Safety, and Health.

**DOE Rating:**

**Measure 1.2:** DOE rates performance as **Good**, based upon a numerical score of 14.31. The score primarily results from contractor injuries that occurred at the NuMI Tunnel and Halls construction project during this period.

**Measure 1.3:** DOE rates performance as **Excellent**, based upon a numerical score of 1.59. DOE notes that The LWCR during the performance period October 1, 2000 through December 31, 2001, is below that of FY00, despite the large number of injuries experienced on the NuMI Tunnel and Halls construction project, which contributed to the score.

Current safety management systems are working effectively. Employees offer suggestions for improvements, which are considered by the appropriate subject matter experts for action. Fermilab's ergonomics program and the efficient and effective use of industrial hygiene personnel are examples of notable practices.

The URA Self-Assessment for CI and LWCR covered DOE expectations for a self-assessment, which include a description of program status, achievements, strengths, weaknesses, possible remedies, and a path forward.

DOE encourages URA to continue efforts to lower the rate and severity of injuries to employees and subcontractor personnel through the continuing use of Integrated Safety Management principles and core functions as applied to all laboratory operations.

<b>Measure 1.4</b>	<b>Total Effective Dose Equivalent</b>
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**Objective:** Minimize radiation exposure for URA employees and users, the public, and the environment.

**DOE Rating:** DOE rates performance for this measure as **Outstanding** based upon a realized TEDE of 12.2 person-rem. In its Self-Assessment, the Fermilab ES&H Section provided an excellent review of its work activities. In reviewing the Self-Assessment, DOE noted two improvement opportunities. First, DOE suggests that future self-assessments include a correlation between accelerator mode of operations, work activities, and the ALARA measures taken to achieve the TEDE of 12.2 person-rem.

Second, it would be helpful if future self-assessment reporting described radiological work activities in all Divisions/Sections (D/S) uniformly. DOE encourages the D/S to perform and document in ESHTRAK the results of radiation protection tripartite assessments, internal audits, and other inspections. Like the Laboratory, DOE wishes to ensure system effectiveness.

The Radiation Safety Subcommittee may want to consider the approach used by the Industrial Hygiene (IH) Subcommittee to maintain a table of expected and completed assessments. This table is in the monthly IH Subcommittee minutes.

DOE notes the increase in “voluntarily” reporting minor radiologically-related incidents during FY01 into both the ORPs and Noncompliance Tracking System (NTS). It is evident that the ES&H Section promotes and that upper management supports the DOE programs for contractor self-identification of issues. Managers appear sensitive to minor deviations from established procedures.

Data table summaries in the Self-Assessment demonstrate that the ES&H Section has a number of internal metrics that enable URA to comply with radiation program protection elements, such as radiation instrument calibrations, resolution of ‘lost badge’ exposure investigations, number of radioactivity analyses regularly performed at the Radioactive Analysis Facility, etc. The ES&H Section benchmarks performance results against the statistics of other DOE facilities. DOE suggests that either the ES&H Section or the Beams Division consider reviewing MUX data to confirm chipmunk operability as another internal performance parameter.

The Self-Assessment contained valuable information on the radiation protection program that is not commonly publicized in procedures, subcommittee minutes, or correspondence. DOE does not take exception to any of the statements provided.

## **E. INFRASTRUCTURE**

<b>Measure 1.1</b>	<b>Project Completion Milestones</b>
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**Objective:** Completion of projects within DOE approved schedule and scope basis.



**DOE Rating:** DOE rates URA's overall performance in the project management area as **Excellent** based on the collective performance of individual projects:

- DOE rates URA's performance in managing Small Projects as **Excellent**. The numerical rating for completing 4 of 5 milestones computes to a Good rating. However, due to the limited number of small project completion milestones, the fact that only one project was completed late, and that there was overall good performance for on-going projects, the overall performance rating should be excellent. At the time this measure was developed it was anticipated that there would be more projects.
- DOE rates URA's performance on CDF and DZero as **Outstanding** and **Outstanding/Excellent**, respectively. CDF met all contract performance milestones, while DZero missed one, but both CDF and DZero achieved Critical Decision 4 (CD-4) in March 2001, as scheduled, and began operations.
- DOE rates the overall NuMI project performance as **Good** based on factors mentioned below and improvements the project has made during the performance period. During this performance period the following significant events occurred:
  1. Restructuring of project management to improve oversight of subcontractor construction work;
  2. Increasing manpower on the technical components to complete the designs to an appropriate level;
  3. Type A accident investigation; and
  4. Rebaseline of project to incorporate a \$33 million increase in the Total Project Cost and a two year delay in project completion.

By contrast, URA rated project performance as **Outstanding**, based strictly upon meeting the planned project milestones. DOE notes that one milestone, "Tunnel Boring Machine excavation completed by SAH" originally was scheduled for completion by May 31, 2001. Since the overall project was in the process of being rebaselined, the milestone was rescheduled to December 31, 2001, and was completed on December 8, 2001.

- DOE rates performance on the Wilson Hall Safety Improvement Project as **Outstanding**. The project made significant progress during the performance period and was completed ahead of schedule, within budget, and safely. Only one lost-time accident occurred on the project.
- DOE rates performance on the U.S. CMS Project and the U.S. LHC Accelerator Project as **Outstanding**. These projects are making excellent technical progress, and both maintain excellent cumulative cost and schedule performance against the project baselines.

These U.S. LHC Project efforts are very well managed, important milestones continue to be met, and contingency is adequate to meet U.S. deliverables for project completion.

DOE also reviewed the URA Self-Assessment to evaluate how the Laboratory evaluated its own performance. URA's Self-Assessment addresses the identified performance measures; however, overall project management performance is not assessed. Evaluating overall performance is a critical step in identifying strengths, weaknesses, solutions, and paths forward. DOE expects such an evaluation to be included in the FY 2003 Self-Assessment.

### **Measure 2.1      Scheduled Maintenance**

**Objective:** Reliable and efficient operation of facilities.

**DOE Rating:** DOE rates performance as **Outstanding** based upon a numerical score of 92%. This score is an improvement over last year's score of 82%. The high percentage of scheduled maintenance indicates that only 8% of the maintenance dollars are spent on non-planned activities and suggests that URA is maintaining facilities well.

URA's Self-Assessment for this measure is excellent and is a large improvement over last year's Self-Assessment. The DOE performance measure was only a part of the Self-Assessment, which addressed eight questions involving both results and process.

### **Measure 3.1      Cyber Security**

**Objective:** Establishment of a cyber security program in accordance with applicable DOE orders and policies.

**DOE Rating:** DOE rates performance as a **Pass**, based upon a Pass/Fail performance criterion. URA combined a Self-Assessment and Peer Review of its Computer Security Program Plan (CSPP) on February 27-28, 2001. The Peer Review Committee found computer security activities to be in compliance with its CSPP and found that the CSPP and Laboratory security plans are well matched to the particular environment at Fermilab. URA developed plans for specific activities over the next 12 months, including: 1) completing the implementation of strong authentication; 2) implementing some vulnerability scanning; 3) implementing a Business Services Section firewall and virtual private network; and 4) implementing a perimeter protection firewall for a portion of the network.

The Peer Review committee felt that the combined self-assessment and peer review format was useful and that the two functions should not be separated.



URA's Self-Assessment for Cyber Security is covered in the "Self-Assessment and Peer Review of Fermilab's Computer Security Program report.

DOE recommends that URA continue efforts to fulfill the 12-month plan and revise/update the CSPP as necessary.

## System Assessment

### F. ENVIRONMENT, SAFETY AND HEALTH

**Overall Objective:** Conduct all work and manage all Laboratory facilities with distinction, fully integrated with the scientific and technology mission, while being protective of our workers, the public, and the environment.

#### Measure 1.1 Environmental Releases

**Objective:** Produce a report that identifies and discusses the number and types of accidental, unexpected, non-permitted environmental releases/spills that exceed a regulatory reporting threshold or which exceed permitted release levels.

**DOE Rating:** DOE rates performance as a **Pass**. The URA Self-Assessment adequately covered the required performance. The performance summary clearly identified exceedences and their sources, which related directly to the NuMI construction project. The summary also provided that routine, on-going Fermilab activities did not result in permit exceedences at the non-construction outfalls.

The Self-Assessment included helpful graphs showing the ranges of total suspended solids (TSS) and pH during the 15-month performance period. The Self-Assessment also documented significant efforts by Fermilab Divisions and Sections to identify and address the causes of exceedences. A bit more discussion would have been useful regarding how URA might avoid similar construction-related permit compliance challenges in the future.

DOE recognizes that extensive tunneling is a new experience for URA and that the Laboratory expended extensive effort in addressing the permit exceedence issue. Efforts included applying for a modified permit that allowed the use of additional chemical and physical water treatment prior to releases as well as frequent oversight of subcontractor activities related to effective treatment implementation.

URA achieved compliance with the NPDES permit conditions. Graphs show the improving trends for TSS and pH compliance.

Compliance costs for the NuMI project have been high, and lessons have been learned from the experience. Better internal review, improved coordination of new projects, and requesting experts to follow up on any potential issues where URA experience is limited could help alleviate similar issues in the future.

## Measure 2.1 Minimize Waste and Promote Recycling

**Objective:** Reduce waste generation by implementing effective pollution prevention and waste minimization initiatives in work performed.

**DOE Rating:** DOE rates performance as *Outstanding/Excellent*. URA achieved outstanding progress in projects identified to receive funding for pollution prevention-related initiatives. The Laboratory appears to be extending the waste reduction work ethic to line management and employees with the availability of funding for work related to waste reduction, including restoration and reuse of facilities. Since funding for waste management will not be allocated in a separate budget category in FY 2003, this source of funds may disappear if Laboratory management does not specifically identify funds for waste management related activities.

The Environmental Protection Subcommittee of the Laboratory Safety Committee is a useful resource and tool for promoting waste reduction opportunities. The committed efforts of this group have contributed to program successes in identifying, considering, and implementing waste reduction initiatives lab-wide.

URA's Self-Assessment needs to identify deficiencies in program implementation, room for improvement, and a path forward for the waste reduction initiatives. The Self-Assessment did not address how (or whether) waste reduction opportunities routinely get considered in planning work and experiments. DOE expects to see this need addressed both in routine management systems and in the FY2002 Self-Assessment.

The Self-Assessment superbly highlighted restoration and reuse initiatives, although it fell short of expectations by failing to identify additional significant achievements, such as the contributions of 1) Business Services personnel in facilitating materials and equipment recycling and reuse initiatives and in purchasing materials with recycled content; and 2) the Facilities Engineering Services Section role in acquiring government property for reuse at Fermilab. Such contributions demonstrate the commitment and value routinely placed upon waste reduction efforts in various areas of Laboratory operations outside of ES&H. Future Self-Assessments should provide such balance to program evaluation.

## G. INFRASTRUCTURE

**Overall Objective:** Effective and efficient real estate management.

**Overall Self-Assessment Comments – Infrastructure:** This year's excellent Self-Assessment is a large improvement over that of last year. The performance measures are only a part of the Self-Assessment, which addressed a series of eight questions, including results and process.

### Measure 1.1 Accuracy of the Energy Management System 3

**DOE Rating:** DOE rates performance as **Outstanding** based upon a numerical score of 100%. A score of 100% indicates that the data in the EMS 3 and FIMS systems have been validated and are consistent.

### Measure 1.2 Reduction in Substandard Square Footage

**DOE Rating:** DOE rates performance for this measure as **Good** based upon the Facility Condition Index of all onsite facilities and URA's failure to complete the measure and to address it in the Self-Assessment. The measure required that URA evaluate selected facilities for the purpose of reducing the amount of substandard space at the site. URA explained that its failure to complete the measure requirements during the performance period and to perform a Self-Assessment for this measure was an oversight. Therefore, DOE requested information for purposes of preparing this Summary Appraisal which was provided as follows:

URA completed required maintenance on 35 facilities, thereby reducing from 45 to 10 the number of facilities that would be defined as substandard using a Facility Condition Index of greater than 5%. The Facility Condition Index is defined as the Deferred Maintenance divided by the Replacement Value. The remaining 10 facilities are small buildings that primarily need repair of the building envelopes. The estimates for the repairs are substantial when compared to the Replacement Value, which is based on the historical acquisition cost of the building. In addition, these 10 substandard buildings do not have a significant cost impact.

DOE recognizes that the failure to perform this particular measure does not have significant immediate effect on costs or operations. In fact, DOE has not included this measure in the FY 2002 set of performance measures. Nevertheless, URA should have met contract requirements by doing required work and the Self-Assessment. Such an omission should not occur in the future.

### **Measure 2.1 Continuous Improvement**

**Objective:** Continuous improvement in the productivity, service, efficiency, and cost savings for areas and activities associated with the facility maintenance and engineering.

**DOE Rating:** DOE rates performance as **Outstanding** based upon URA's Self Assessment.

### **Measure 3.1 Energy Requirements Accomplished**

**Objective:** Energy Management initiatives are managed consistently with a comprehensive energy management plan that includes the minimum requirements of DOE O 430.2.

**DOE Rating:** DOE rates performance as **Outstanding** based upon a numerical rating greater than 95%. URA's performance in the energy management area has resulted in awards won for individual projects and for the team that identifies and prioritizes projects. URA has documented the energy management program in the management plan and has accomplished activities identified in that plan.

### **Measure 4.1 Alternative Financed Projects**

**Objective:** Increased use of alternative financed energy efficiency projects.

**DOE Rating:** DOE rates performance as **Outstanding** based upon a numerical rating of >4. URA has successfully developed and implemented alternative financed energy programs with ComEd and NICOR. These programs are models within DOE.

### **Measure 5.1 Increase in Efficiency of Federal Buildings**

**Objective:** Implementation of Presidential initiatives to protect the environment by increasing the efficiency of Federal buildings.

**DOE Rating:** DOE has determined that the expectations for this measure have been met. There is no numerical score. URA has developed systems to implement Presidential Initiatives related to energy efficiency. The Laboratory has completed site-wide energy audits to identify EPA Energy Start applications and incandescent lamp locations for retrofit projects. URA also has accomplished training on sustainable design.

<b>Measure 6.1</b>	<b>Fermilab Energy Use Reductions</b>
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**Objective:** Energy use reductions show continuous improvement and are on target to meet the FY 2005 requirement of 30 percent reduction in energy use per square foot from FY 1985.

**DOE Rating:** DOE rates performance as **Outstanding**. URA has exceeded the FY 2005 target of 30% reduction in energy use per square foot. URA has implemented a 63% reduction, thereby substantially exceeding the target identified in the DOE-wide goal. URA continues to explore ways of further reducing energy use due to the budget impact of such reductions.

## H. BUSINESS

<b>Measure 1.1</b>	<b>Human Resources – Balanced Scorecard</b>
<b>Measure 2.1</b>	<b>Human Resources – Job Evaluation System</b>

**Objective (1.1):** URA will have a comprehensive performance system that establishes goals tied to the entire organization's mission.

**DOE Rating:** DOE rates performance under this measure and for the overall Human Resource function as **Outstanding**. URA provided access to a web-based quarterly report detailing balanced scorecard results and developed FY 2002 targets for the balanced scorecard measures before the end of FY 2001. DOE believes these targets are realistic and provide incentive for the URA to improve performance. A review of the results for the first quarter of FY 2002 also shows progress in various areas.

**Objective (2.1):** Analyze another statistical sample of position descriptions to determine the appropriateness of the assigned classification.

**DOE Rating:** DOE rates performance as **Outstanding**. URA reviewed 70 position descriptions during the 15-month period, which was above the target of 66.

### **Self-Assessment Comments – Human Resources:**

**Labor Relations** The Self-Assessment provided a good description of the unions at Fermilab and the successes and difficulties in past negotiations. DOE notes that during the past year the labor union climate has been extremely tense due to difficult negotiations with the International Association of Machinists and Aerospace Workers, Local No. 701. URA did a good job of identifying weaknesses and developing a plan for improving the labor relations program. However, more statistical analysis of each bargaining relationship, such as number of lawsuits pending, number of grievances filed, labor arbitrations won or lost, and unfair labor practices charges filed would be useful.



Also, it would be helpful to show some indication of how the record's trend is changing and whether URA believes the trends and records are positive or negative and why and whether the trends reported confirm or deny managerial expectation. Based on some good progress with the bargaining unit negotiations and some newly forged relationship with the Business Agent, URA believes the labor climate is improving, but URA needs to continue to look for opportunities to demonstrate good will and work toward a productive relationship.

**Employment** – The Self-Assessment provides a good description of the department; however there should be more detail on some of the activities. Following are some suggestions:

- Clarify what information is included in the termination questionnaire and why it is given to the Employee Relations Office;
- Explain the Illinois Department of Employment Security Form;
- State when the department will send out its internal mailing to all department heads and line supervisors reminding them of their responsibilities and procedures are for terminating employees.

DOE notes that URA has implemented changes in order to improve this program and has an action plan for future improvements.

**Visa Services** – The Self-Assessment was well written and contains a good description of the process. It also notes several successes and contains a list of weaknesses and plans for improvement. This is a good approach to a self-assessment.

**Information Resources** – DOE suggests that a different approach to self-assessment be used in the future. A voluminous set of policies and procedures does not constitute a self-assessment.

### Measure 3.1 Training

**Objective:** Appropriate training is delivered on a cost-effective basis within the needed timeframe.

**DOE Rating:** DOE rates performance as **Outstanding**. Although the FNAL Training and Development Department chose to assess two processes (administering onsite classes and processing tuition reimbursement requests) that are not directly related to the performance measure, URA provided sufficient data in support of the adjectival rating of "Outstanding" from the ES&H Section's Oracle database. DOE notes that URA has been able to obtain a high course completion rate for required training classes outside of the ES&H arena (i.e., supervision of summer/Coop students, supervisory development, and sexual harassment).

Although the Self-Assessment provided a thorough description of the two processes listed above, the reviewer would have benefited from a discussion of the impact of the Training and Development Advisory Committee on the training completion rates.



A more specific explanation of the processes that URA put in place to achieve these high participation rates (i.e., completion of the Individual Training Needs Assessments, the role of supervisors, etc.) could serve as a best practice for other contractor training organizations. Although URA is not required to report the results of training evaluations, it would have been interesting to have a summary of this information included in order to determine whether there was a correlation between the high training completion rates and overall course effectiveness.

The Training and Development Department is doing an excellent job of ensuring that employees' training needs are identified and that employees complete required courses in a timely fashion. The results of the Fermilab annual training cost update indicate that the Training and Development Department is providing the requisite training in a cost-effective manner.

#### **Measure 4.1      Diversity**

**Objective:** Strengthen commitment and accountability to Equal Employment Opportunity and affirmative action and maintain a diverse workforce.

**DOE Rating:** DOE rates overall performance in this area as **Excellent**. URA has provided a description of the Equal Opportunity and Counseling Office identifying the major processes and functions of the office. The discussion assesses Recruitment of Summer Programs, one of the major functions of the Equal Opportunity Office. The assessment addresses all of the expectations DOE identified in the Self-Assessment process, including successes (results), weaknesses, and opportunities for improvement (action items and goals) for this function.

DOE suggests that the Self-Assessment for FY 2002 address strategies that specific Divisions/Sections and managers use to impact the Diversity performance measure. For example, URA could address what retention/recruitment strategies it uses laboratory-wide to maintain or increase diversity. The performance measure applies to laboratory -wide performance and not just that of the Equal Opportunity Office.

#### **Measure 5.1      Property – Balanced Scorecard**

**Objective:** Implementation of the DOE Contractor Personal Property Management Balanced Scorecard Performance Measurement and Management Program, dated December 18, 1987.

**DOE Rating:** DOE rates overall performance as **Good** based upon the completion of the Balanced Scorecard for property. DOE evaluated URA's Balanced Scorecard and has observations in the following areas.

### Customer Perspective

Core Measure #1, Customer Surveys: Customer surveys need to incorporate three core elements: Timeliness, Quality, and Partnership.

Core Measure #2, Internal Customer: Performance for this measure does not meet the expectation and is unacceptable. The FY 2002 Balanced Scorecard identifies and requires a Corrective Action Plan for this measure.

Core Measure #3, Accuracy of Property Assignments: Performance for this core measure is incomplete. Two elements, including sensitive items and equipment items should have been addressed during the reporting period. The FY 2002 Balanced Scorecard identifies and requires a Corrective Action Plan.

### Internal Business Perspective

Core Measure #1, National Targets: The Balanced Scorecard Self-Assessment does not reflect the established Balanced Scorecard National Targets for the "acquisition cost" and "line item" elements for each physical inventory: 1. Equipment 2. Sensitive Items 3. Stores. With respect to the physical inventory of biennial equipment items, updating results after the Security Report is unacceptable. Inventory results need to be measured prior to records being reconciled. URA misidentified stores inventory in their assessment, identifying it as an Optional Measure. The assessment was missing "Item Count" for the stores inventory and should have been included in this core measure.

The Stores Inventory has two reportable elements, Item Count and Dollar Value. The assessment is located in core measure #1 the Item Count, which indicates database accuracy and accountability. The Dollar Value needs to be calculated at the time of inventory, rather than be continuously adjusted by a "moving cost average."

Core Measure #2, Motor Vehicle Local Use Objectives: DOE notes that the quarterly results in the Balanced Scorecard are inconsistent with results submitted to DOE for approval of FY 2001 Local Use Objectives.

Core Measure #3, The response to this measure should have been "Non-reportable", since the transitional implementation of a new computer system prevented complete and accurate data from being available for this reporting period.

### Learning and Growth Perspective

Core Measure #1, Communication Plan: The Balanced Scorecard Plan needs to identify elements of the Communication Plan. The Balanced Scorecard Self-Assessment reports on what elements URA performed, which provides a measure of meeting elements of the Communication Plan.

Core Measure #2, Employee Alignment: URA has not completely met three core elements: Property Management scheduled training; Professional Property Management Individual Development Plans; and Professional Property management performance reviews.

#### **Measure 6.1 Procurement – Balanced Scorecard**

**Objective:** Implementation of the Balanced Scorecard Performance Measurement and Performance Management Program for Federal procurement and Contractor Purchasing Systems.

**DOE Rating:** DOE rates performance as **Good** based upon the following discussion.

DOE used information from the following sources to support this Appraisal:

- Balanced Scorecard for Procurement;
- DOE Review of the Neutrinos at the Main Injector (NuMI) Project, May 22-24, 2001;
- Joint DOE FAO and Fermilab Review of Construction Subcontractor Program, June 29, 2001 (Joint Review);
- Actions taken to address concerns identified in the FY 2000 Summary Appraisal Report for Fermilab (April 25, 2000); and
- Other relevant information.

In the FY 2000 Summary Appraisal, DOE documented concerns, which included roles and responsibilities, communications among Divisions and Sections of the laboratory, and adequate oversight of construction subcontracts. Evaluation of procurement performance for this FY 2001 Summary Appraisal included assessing how URA addressed those concerns. DOE has not seen notable progress against problems identified in the FY 2000 Summary Appraisal.

During the FY 2001 performance period, internal document controls were not in place on the NuMI civil contract or on modified contracts. A finding of the May NuMI review confirmed an immediate need for correction. In response, URA let a subcontract to replace the very limited and ineffective system with a more extensive system able to track document flow and completion.

The Joint Review targeted the improper use of modified construction contracts. One of the review findings identified the improper use of modified construction contracts for procurement. In particular, the review found that URA was performing insufficient post-award subcontract administration.

DOE directed URA to stop using modified construction contracts and requested that the 312 remaining active modified contract procurement files be assessed for compliance.

Using an 18-point checklist, URA found the files to be 95% compliant; however DOE found the checklist itself to be inadequate because it addressed only half of the procurement process by failing to address post-award subcontract administration. Consequently, to obtain performance, DOE developed a contract performance measure for FY 2002 that requires URA to produce and follow a checklist for post-award subcontract administration.

The Labor Standards Reports for the period October 1, 2000 – October 1, 2001, indicated that URA awarded 319 contracts at a value of \$22,165,000. URA performed four person-to-person interviews to validate that subcontractors were paying their employees proper wages. Four interviews for 319 contracts translate to approximately 1%, which is insufficient for the existing work volume.

URA achieved minimal compliance with the contract Make-or-Buy Plan provisions. The idea of the Make-or-Buy Plan is to implement a continuing review process. DOE notes that detailed analyses were prepared for specific functions/services in 1996, 1997, and 1998; however, without an overarching requirement to do so, URA did none in 1999, 2000, or 2001.

<b>Measure 7.1</b>	<b>Intellectual Property – Timeliness of Invention Administration</b>
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**Objective:** Promote the utilization and development of inventions and discoveries in support of the Laboratory's science and technology transfer missions.

**DOE Rating:** DOE rates performance as **Excellent**. The number of invention disclosures for Fermilab oscillates depending on the stage of the next major experimental run. URA has been good at getting the invention disclosures filed with DOE in a timely manner. The comparatively low election rate (rate of pursuing patents) at this single-purpose laboratory is indicative of the highly-specific high-energy physics science done here, as opposed to the higher election rate at multi-purpose laboratories.

<b>Measure 7.2</b>	<b>Intellectual Property – Government Rights</b>
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**Objective:** See Measure 7.1, above.

**DOE Rating:** DOE rates performance as **Excellent**. Although the vast majority of technical papers do not contain inventions, since they are theoretical in nature, URA performs timely reviews of publications. With respect to trademarks, Fermilab has been one of the lead laboratories in obtaining registration of the trademarks associated with the laboratory. Although, the Laboratory does not handle a great number of CRADAs or WFOs, URA accomplishes its responsibility in implementing these plans a timely manner.

<b>Measure 7.3</b>	<b>Intellectual Property – Procurement and Technology Transfer Instruments</b>
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**Objective:** See Measure 7.1, above.

**DOE Rating:** DOE rates performance as **Excellent** because URA incorporates all intellectual property regulations into Fermilab forms for subcontracts.

<b>Measure 8.1</b>	<b>Science and Technology Information – Deliverables</b>
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**Objective:** Support DOE mission through partnerships having the potential to benefit the national policy objectives or to contribute to the national economic and scientific base.

**DOE Rating:** DOE rates performance as **Outstanding** on the basis that URA submitted 100% of all deliverables to OSTI electronically. This achievement exceeds the goal established by OSTI.

The URA Self-Assessment consisted only of the rating of the performance measure with Fermilab's technical publication procedure attached. Although the attachment of procedures does not constitute a Self-Assessment, the documentation provided is considered adequate given URA's outstanding performance against the established goals. In future Self-Assessments, DOE will expect a more thorough evaluation of the overall area of Science and Technology Information Deliverables.

<b>Measure 9.1</b>	<b>Technology Transfer and Work for Others</b>
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**Objective:** Support DOE mission through partnerships having the potential to benefit the national policy objectives or to contribute to the national economic and scientific base.

**DOE Rating:** DOE rates performance as a **Pass** in this area. As noted in Measure 7.2, URA does not have many CRADAs and WFOs due to the laboratory mission.

<b>Measure 10.1</b>	<b>Financial Management System – Uncosted Balances</b>
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**Overall Objective:** Ensure that the Laboratory's financial system is sound, responsive, and has economical financial management programs. It also shall support an aggressive Laboratory-wide overhead management program.



**DOE Rating:** The overall rating for Financial Management is **Excellent**. The rating for this measure (10.1) is also **Excellent** based on the individual elements that ranged from Marginal to Outstanding. The one Marginal rating was on the NuMI project and resulted from schedule slippage on the project and a deliberate plan to carry over uncommitted funds for a large subcontract in the following fiscal year. Additional factors that contributed to the overall rating of Excellent are discussed below in Measure 10.2.

<b>Measure 10.2    Financial Management System – Delinquent Receivables over 90 and 180 Days</b>
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**Objective:** See Overall Objective in 10.1, above.

**DOE Rating:** DOE rates performance for this measure as **Excellent**, based upon the collection of 99.5% of the expected 100% of receivables within 180 days.

The URA Self-Assessment for this measure resulted in a grade of Outstanding, based on 96.1% collected within 90 days and 99.5% collected within 180 days (leaving .5% uncollected after 180 days). Although the Laboratory did exceed the 95% within 90 days, it did not meet the 180-day expectation of having 100% of the receivables collected.

**Self-Assessment Comments – Financial Management:**

The URA Self-Assessment was also to cover Conferences, Travel Costs, Internal Audit, and management of Indirect Costs and was supposed to address:

- Whether the Contractor's cost accounting system is in compliance with Cost Accounting Standards (CAS) and whether the Disclosure Statement is current, accurate, and complete;
- Internal audit review for unallowables;
- Related party transactions.

URA's Self-Assessment did state that the management of the accounting department has ascertained that the Laboratory "Cost Accounting System" is in compliance with CAS and the "CAS Disclosure Statement" is current, accurate and complete. However, the Self-Assessment did not cover the other above-listed items.

DOE believes that URA has not demonstrated that its accounting system is in compliance with all aspects of Accounting Standard 405 - Accounting for Unallowable Costs. A recent draft IG audit report that covered the performance period being evaluated, identified unallowable costs for liquor being charged under the contract. CAS 405 requires the identification and segregation of unallowable costs. This audit revealed that an inadequate review of subcontractor invoices was a contributing factor towards the unallowable costs being charged to the contract.

Also during this reporting period, another DOE review identified inappropriate use of modified contracts that resulted in the obligation of funds not being recorded until the billing was received from the subcontractor. Although URA made immediate corrections, the late obligation of funds was an internal control weakness for a significant period of time.

#### **Measure 11.1    Safeguards and Security – Self Assessment Program**

**Objective:** Implement a safeguards and security self-assessment program to ensure internal monitoring of compliance and performance with safeguards and security.

**DOE Rating:** DOE rates performance as a **Pass**. A DOE review of Fermilab's Security program involving all topical areas resulted in a passing grade. URA mitigated the one review finding concerning supervisory training and either addressed or is addressing each of four recommendations. The program for protection of DOE property appears to remain effective. There have been no unusual incidents involving property loss at Fermilab during the reporting period. An opportunity exists to enhance property protection by installing card key access control systems in key areas and facilities. URA began investigating the feasibility of such a system in Spring 2001.

During the performance period, URA revised the Site Security Plan twice and updated the Vulnerability Assessment to consider, in the wake of September 11<sup>th</sup> events, the potential for and the consequences of terrorist activities.

The program for nuclear material control has experienced no degradation or discrepancies in inventory records. The Laboratory has maintained an accurate Nuclear Materials Accounting System.

The URA Self-Assessment components for this measure are satisfactory. DOE recommends that URA continue efforts to fulfill review recommendations referenced above, enhance property protection through key card installations, and revise/update the Site Security Plan as needed.

#### **Measure 11.2    Counterintelligence – Foreign Travel Notification**

**Objective:** Meet the notification requirements for foreign travel to sensitive countries.

**DOE Rating:** DOE rates performance as a **Pass**. URA met the expectation for advance notice of foreign travel to sensitive countries 100% of the time. However, the Laboratory met the post-trip requirements less than 5% of the time. The deficient performance reflects failure to collect trip reports from travelers.





## Department of Energy

Washington, DC 20585

March 11, 2002

Mr. Marvin E. Gunn, Jr.  
Manager  
Chicago Operations Office  
U.S. Department of Energy  
9800 South Cass Avenue  
Argonne, IL 60439

Dear Mr. Gunn:

For the period of October 1, 2000, through December 31, 2001, the Fermi National Accelerator Laboratory's (Fermilab) overall performance on Office of Science (SC) science and technology programs is rated as Excellent, with a weighted average score of 3.4 on a 4.0 system. This summary rating represents the overall performance evaluation for program areas supported by the SC Office of High Energy Physics, as required by the contract for the maintenance and operation of Fermilab.

We are concerned about the laboratory's performance in the past 15 months. Fermilab's Program Management has not improved from its relatively low rating for FY 2000. Far more problematic, performance in the area of Constructing and Operating Research Facilities has declined significantly from 2000, to a low rating of 2.5 out of a possible 4.0. We hope that changes that have been made to address management difficulties of the NuMI/MINOS project will solve many of these problems, and that Fermilab's management will continue to focus on improving its overall performance in these two areas.

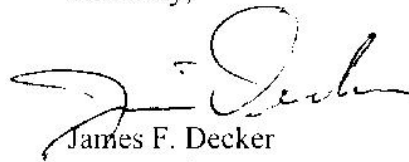
Recent news about Tevatron luminosity problems is also a matter of serious concern. Luminosity is the key to the ability of the laboratory to make major discoveries in Run II, in particular that of the Higgs Boson. We recognize that the laboratory is making a concerted effort to solve this problem, and that it has a carefully crafted plan to achieve the luminosity goals of Run II. We understand that the program office intends to follow the progress made by the laboratory on a continuing basis, and we expect to receive regular reports.



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Enclosure 1 provides a breakdown of the four Performance Measures, as well as the ratings for each and an overall rating. Also enclosed is the full narrative evaluation from the program office.

Sincerely,

A handwritten signature in black ink, appearing to read "J. Decker", written over the printed name.

James F. Decker  
Acting Director  
Office of Science

Enclosures

Enclosure

OFFICE OF SCIENCE  
FY 2001 APPRAISAL OF  
FERMI NATIONAL ACCELERATOR LABORATORY

Measure 1: Quality of Research

Rating:      **3.6    Outstanding**

Measure 2: Relevance to DOE Missions and National Needs

Rating:      **3.8    Outstanding**

Measure 3: Success in Constructing and Operating Research Facilities

Rating:      **2.5    Good**

Measure 4: Effectiveness and Efficiency of Research Program Management

Rating:      **3.0    Excellent**

**OVERALL RATING:      3.4    EXCELLENT**

**Office of Science  
Division of High Energy Physics  
FY 2001 Performance Appraisal for Fermi National Accelerator Laboratory**

**1.1 Quality of Research**

The Fermilab (FNAL) science program is a flagship effort of the national high energy physics (HEP) program and makes unique and important contributions to the worldwide advancement of the field. In the past year, the long-anticipated Run II of the Tevatron began and the upgraded CDF and D-Zero experiments were commissioned and took their first data in five years. Though it is too early to expect scientific results from these experiments, the initial results from detector commissioning indicate that these complex experiments have been successfully rebuilt to state-of-the-art and will perform as advertised. As Run II continues, we expect many world-class physics results to be produced.

In addition, physics results from the 800 GeV fixed-target program, which concluded in 1999, are now being finalized and published. There are many significant results. Perhaps the most interesting result from this area in 2001 was the determination of the weak mixing angle by the NuTeV experiment. This result is about 3 standard deviations from the expectation based on precision measurements previously announced by the LEP and SLD experiments, and may be indicative of new physics. The importance of these results from a smaller, "lower priority" experiment indicates the significant value added from maintaining a diverse research portfolio.

Physics results from other FNAL efforts, particularly in particle astrophysics, have also been major accomplishments of FY2001, judging from refereed publications, independent peer reviews, and coverage in the popular media. A notable example is the results from the Sloan Digital Sky Survey, headquartered at FNAL, which are now reaching publication and reshaping theories of the evolution of the universe.

**Rating: 3.6 (Outstanding)**

**1.2 Relevance to DOE Missions and National Needs**

The lab's physics priorities are well aligned with those of the national HEP program, as they should be for a flagship program. Tevatron Run II is one of the highest national HEP priorities due to its potential for significant physics discoveries. FNAL is also the center of U.S. effort in neutrino physics, and maintains important efforts in kaon and B-meson physics, complementary to the SLAC B-factory. FNAL also provides management and research expertise to several forefront experiments in particle astrophysics. Efforts in accelerator R&D and detector and information technologies are providing the tools

needed for next-generation experiments. Maintaining this strong and diverse program in the face of budget constraints is a continuing challenge for lab management.

As host laboratory for the U.S. CMS experiment, as well as the future U.S. CMS computing center, the lab has taken on an important leadership role for this vital future experiment at the LHC. FNAL is also host laboratory for the U.S. LHC accelerator effort, and is making important contributions of magnets for the LHC accelerator project. Other elements of the FNAL technology R&D enterprise also contribute to the national HEP program through research in superconducting magnet technology for future frontier facilities, and by developing test facilities and industrialization experience for a high energy Linear Collider. These efforts are a key to the long-term health of the HEP research program, and were commended by the recent HEPAP Long-Range Planning Subpanel.

**Rating: 3.8 (Outstanding)**

### **1.3 Success in Constructing and Operating Research Facilities**

Operations of the Tevatron complex for Run II, and the associated experiments, began on time in March 2001. This is a significant achievement given the long and complicated upgrades involving both detectors and the new main injector. Initial running showed an encouraging ramp in luminosity, which subsequently has plateaued and resulted in disappointing performance for overall delivery of data to the experiments in the first year. Commissioning of the experiments has progressed as expected and is now mostly limited by the ability of the machine to provide high data rates. Tevatron operational reliability and safety performance have been good. Detailed plans have been made for a dedicated program to improve machine luminosity.

Construction of the NuMI beamline for neutrino physics has been plagued with cost overruns, schedule slippage, and safety concerns. Some of these issues are due to poor performance by contractors in a tight construction market, but lack of sufficient laboratory engineering support and construction project oversight have also been contributing factors. These problems led to a request to rebaseline the project; the rebaseline was approved in December 2001. By the end of FY 2001, FNAL had made significant improvements in construction oversight. The associated MINOS detector project, also managed by FNAL, has progressed very well and is holding to schedule.

The new MiniBooNE neutrino beam line and experiment has also suffered some civil construction delays and cost overruns, but on a much smaller scale, and will begin taking data soon.

Fermilab is also playing a leading role in the construction of detectors, accelerator magnets, and computing and software infrastructure for the LHC. This work on large, complex international projects has been on schedule and on budget, and the detector and

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accelerator projects are now over 60% complete. Good progress has also been made in particle astrophysics projects managed by FNAL; both the Auger and Cold Dark Matter Survey projects reached important milestones by installing and commissioning detectors in FY 01.

FNAL's record of innovation in developing next-generation tools has remained strong, including advances in detector technology needed for the proposed BTeV experiment, superconducting magnets for possible LHC upgrades and future facilities, and information technology developments for Grid computing and LHC experiments. FNAL participation in U.S. Linear Collider R&D, though limited, has been effective and important.

Fermilab also maintains a strong tradition of user involvement and participation in all aspects of the lab's programs. The FNAL User Group is active, vocal and effective. Recent user concerns mostly reflect frustration with the slow pace of Tevatron luminosity

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Fermilab management continues to make conscientious efforts to effectively manage a broad research program with several projects at various stages of completion; their record of success has been mixed. FNAL efforts in managing US LHC accelerator and US CMS detector work have been active and quite successful. FNAL is also effectively managing the large software and computing efforts for US CMS, is taking a leading role in developing the CMS research program for the future, and is preparing to make its participation in LHC a central part of the laboratory's long-range program.

Fermilab has brought the Run II accelerator and detector upgrades to completion, but faces continued challenges in Tevatron commissioning. Further accelerator upgrades and detector replacements for high luminosity operations are looming on the horizon, will require an aggressive schedule, and will be technically challenging. These efforts need continuous management vigilance for success.

Management of the NuMI/MINOS project has not been highly successful. At the end of 2001, the project was rebaselined with a significant increase in project TPC and delay in completion. Moreover, significant safety incidents occurred during the year and resulted in outside investigations. More proactive intervention by FNAL management in the past might have avoided some of these problems. FNAL has made changes to address these management difficulties, and by the end of FY 01, improvements had been made. The project continues to be closely watched.

**Rating: 3.0 (Excellent)**

**Overall Rating: 3.4 (Excellent)**